

cubes, are arranged in various powerful configurations driving intense unidirectional magnetic field B across a non-magnetic gap many times larger than economically feasible otherwise. This gap accommodates a conduit for pressurizing and moving a flow of molten metal. In making multiple identical castings, a controlled, intermittent, predetermined flow of molten metal is fed to a series of identical individual molds. The invention obviates needs for operating metallurgical valves or expensive tilting mechanisms for metallurgical furnaces. Existing furnaces too low to permit inflow by gravity may be rendered usable by embodiments of this invention.

REMARKS

The present application is a continuation-in-part of co-pending application Serial No. 09/483,813, filed January 15, 2000. Applicant has amended the application to include a cross-reference to the co-pending parent application. Applicant has cancelled Claims 2-46, and added new Claims 61-76. Original Claim 1 has been retained to ensure co-pendency. Favorable consideration of the accompanying patent application is courteously solicited.

Respectfully submitted,

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VERSION WITH MARKINGS SHOWING CHANGES MADE

IN THE TITLE:

Methods[, System and Apparatus] Employing Permanent Magnets  
Having Reach-Out Magnetic Fields for Electromagnetically  
[Transferring] Pumping, Braking, and Metering Molten Metals  
Feeding into Metal Casting Machines

IN THE SPECIFICATION:

Please see the following page with markings showing changes  
made to the first page of the Specification.

METHODS [ , SYSTEM AND APPARATUS] EMPLOYING  
PERMANENT MAGNETS HAVING REACH-OUT MAGNETIC  
FIELDS FOR ELECTROMAGNETICALLY  
[TRANSFERRING] PUMPING, BRAKING, AND METERING MOLTEN  
METALS FEEDING INTO METAL CASTING MACHINES

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U.S. PATENT DOCUMENTS

4,138,888	2/79	Linder	73/290R
5,099,399	4/91	Bykhovsky et al.	266/237
5,377,961	1/95	Smith et al.	266/237
5,967,223	10/99	Kagan et al.	164/481

OTHER PUBLICATIONS

L. R. Blake, "Conduction and Induction Pumps for Liquid Metals, Proceedings of the Institution of Electrical Engineers, Volume 104 (July 1956) pp. 49-67.

Douglas W. Dietrich, "Magnetically Soft Materials," Metals Handbook, 10th edition, Volume 2 (1990) pp. 761-781.

D. A. Watt, "The Design of Electromagnetic Pumps for Liquid Metals", Proceedings of the Institution of Electrical Engineers, Volume 106 (December 1958) pp. 94-103.

Lester R. Moskowitz, Permanent Magnet Design and Application Handbook, reprint edition (Malabar, Florida: Krieger Publishing Co., 1986).]

IN THE ABSTRACT:

[Apparatus, system and m] Method [for] precisely, [and] quickly control[ling the]s flow of molten metal to metal-casting apparatus[, either] by pumping, [or by] braking or throttling. The Faraday-Ampère [electromagnetic] principle of current flow in a unidirectional magnetic field is employed[, wherein Faraday's three-finger rule shows pumping direction or throttling direction]. Permanent magnets comprising neodymium or similar high-energy, rare-earth materials provide [a unique] "reach-out" magnetism. These neo-magnets, usually shown as cubes, are arranged in various powerful configurations [for] driving [an] intense unidirectional magnetic field B across a non-magnetic gap many times larger than [is] economically feasible otherwise. This gap accommodates a conduit for pressurizing and moving a flow of molten metal. [Molten metal may be pumped to a distributor or a siphon at an entrance to a metal-casting machine. Alternatively, an unconstrained parabolic jet-fountain-stream of molten metal is projected through an inert atmosphere directly into such a machine, thereby avoiding need for long passageways containing fragile refractories for channelling molten metal flows.] In making multiple identical castings, [the invention enables] a controlled, intermittent, predetermined flow of molten metal is [to be] fed to a series of identical individual molds. [Among its advantages are that t] The invention obviates needs for [servo-]operating metallurgical valves or expensive tilting mechanisms for metallurgical furnaces. Existing furnaces [which are] too low to permit inflow by gravity [to a point of casting] may be rendered usable by embodiments of this invention.